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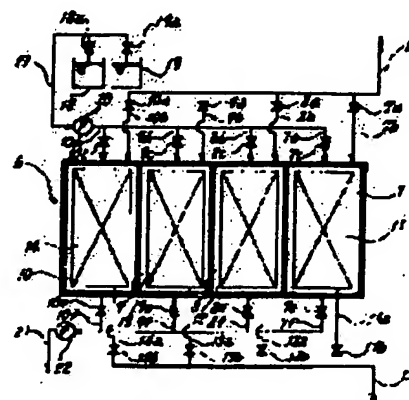
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CLEANING OF SUBMERGED-MEMBRANE DEVICE

Abstract:

OBJECT: To facilitate maintenance services and prolong the life of submerged-membrane device by enabling the device to be cleaned without taking it out of a treatment tank.

BRIEF DESCRIPTION: A treatment tank 6 consists of partitioned treatment sections 7, 8, 9, and submerged-membrane devices 11, 12, 13, 14 arranged in the sections. In addition, an untreated water supply pipe 16, a cleaning liquid supply pipe 17 and an air supply pipe 21 which communicate with each treatment section are arranged. Further, submerged-membrane devices 11, 12, 13, 14 are sequentially cleaned by each treatment section 7, 8, 9, 10 by properly operating the communication between each treatment section 7, 8, 9, 10 and each pipe 16, 17, 21 using a switching valve.



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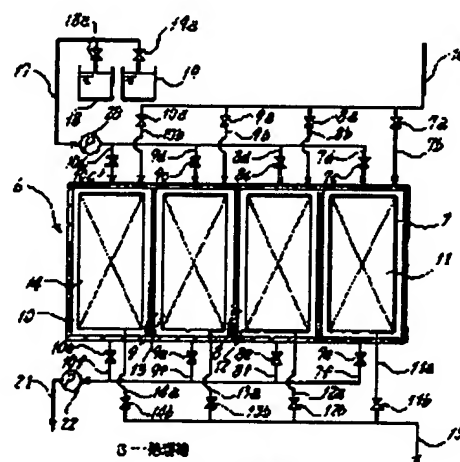
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(54) 【発明の名称】 液中膜装置の洗浄方法

(57) 【要約】

【目的】 液中膜装置を処理槽から取り出すことなく洗浄できるようにし、メンテナンスの容易化および液中膜装置の延命を図る。

【構成】 処理槽6を複数の処理区画7、8、9、10に仕切って各々に液中膜装置11、12、13、14を配置し、各処理区画に連通する原水供給管16と洗浄液供給管17と排水管21とを配設しておき、各処理区画7、8、9、10と各管16、17、21との連通を切換弁により適宜操作して各処理区画7、8、9、10ごとに液中膜装置11、12、13、14を順次洗浄する。



6...処理槽

7、8、9、10...処理区画

11、12、13、14...液中膜装置

16...原水供給管

17...洗浄液供給管

21...排水管

7a、8a、9a、10a...排水切換弁

7b、8b、9b、10b...洗浄液切換弁

7c、8c、9c、10c...排水切換弁

【特許請求の範囲】

【請求項1】 槽内を複数の処理区画に仕切ってなる処理槽に、各処理区画ごとに設けた液中膜装置の洗浄方法であって、各処理区画と原水供給管とを連通する支管に介装した原水切換弁と、各処理区画と洗浄液供給管とを連通する支管に介装した洗浄液切換弁と、各処理区画と排水管とを連通する支管に介装した排水切換弁とを適宜操作して各処理区画ごとに液中膜装置を順次洗浄するようにし、各処理区画における洗浄に際し、処理区画内の被処理水を排水管により排出し、洗浄液供給管より洗浄液を供給して、処理区画内の被処理水を洗浄液で置換し、曝気装置を通じて曝気空気を供給することにより液中膜装置を洗浄することを特徴とする液中膜装置の洗浄方法。

【発明の詳細な説明】

【0001】

【産業上の利用分野】 本発明は、し尿処理施設等において固液分離用途に用いられる液中膜装置の洗浄方法に関する。

【0002】

【従来の技術】 従来、し尿処理施設等においては、被処理水中の活性汚泥や凝集汚泥を分離するために処理槽内に液中膜装置を設けるなどしている。液中膜装置は図2に示したようなものであり、上下が開口した箱状のケーシング1内に上下方向に配置する平板状の膜エレメント2を平行に設け、膜エレメント2の下方に槽内の被処理水に曝気空気を供給する曝気装置3を設けている。

【0003】 そして、吸引手段（図示せず）により膜エレメント2の透過水流路4内に吸引負圧を与えることによって、被処理水中の活性汚泥などを膜エレメント2の透過膜5で捕捉し、透過膜5を透過して透過水流路4内に流入した透過水を処理水として取り出している。

【0004】 このとき、曝気装置3を通じて供給される曝気空気の気泡が持つ剪断力、および気泡のエアリフト作用により生じられる被処理水の上向流によって、膜エレメント2の膜面を洗浄するようにしている。

【0005】

【発明が解決しようとする課題】 液中膜装置は、上記したような曝気空気によるセルフクリーニング機構を有しているため洗浄不要とされてきたが、急激な濃度変化等種々の理由により洗浄が必要となることがある。しかし、従来提案されている洗浄方法では、液中膜装置を処理槽から取り出して薬液洗浄槽に浸漬するなどしなければならず、維持管理上極めて効率が悪いという問題がある。

【0006】 本発明は上記問題を解決するもので、液中膜装置を処理槽から取り出すことなく洗浄できるようにし、これにより、メンテナンスを容易にするとともに液中膜装置の寿命を延ばすことを目的とするものである。

【0007】

【課題を解決するための手段】 上記問題を解決するために、本発明の液中膜装置の洗浄方法は、槽内を複数の処理区画に仕切ってなる処理槽に、各処理区画ごとに設けた液中膜装置の洗浄方法であって、各処理区画と原水供給管とを連通する支管に介装した原水切換弁と、各処理区画と洗浄液供給管とを連通する支管に介装した洗浄液切換弁と、各処理区画と排水管とを連通する支管に介装した排水切換弁とを適宜操作して各処理区画ごとに液中膜装置を順次洗浄するようにし、各処理区画における洗浄に際し、処理区画内の被処理水を排水管により排出し、洗浄液供給管より洗浄液を供給して、処理区画内の被処理水を洗浄液で置換し、曝気装置を通じて曝気空気を供給することにより液中膜装置を洗浄するようにしたものである。

【0008】

【作用】 上記構成により、処理槽から取り出すことなく液中膜装置を洗浄できるので、メンテナンスが容易になるとともに液中膜装置の寿命が延びる。また、複数の処理区画において被処理水の固液分離と液中膜装置の洗浄とを並行して行うことができるので、処理効率が向上する。

【0009】

【実施例】 以下、本発明の一実施例を図面を参照しながら説明する。図1において、処理槽6は4つの処理区画7、8、9、10に仕切られており、各処理区画7、8、9、10の内部に液中膜装置11、12、13、14を設けるとともに、液中膜装置11、12、13、14の下方に曝気装置を設けている（図示せず）。液中膜装置11、12、13、14はそれぞれ透過水を取り出す透過水排出管11a、12a、13a、14aを備えており、各透過水排出管11a、12a、13a、14aは透過水開閉弁11b、12b、13b、14bを介して透過水排出本管15に連通している。液中膜装置11、12、13、14および曝気装置は、図2を用いて説明した従来のもの等、種々のものを用いることができる。

【0010】 各処理区画7、8、9、10はそれぞれ、原水切換弁7a、8a、9a、10aを介装した支管7b、8b、9b、10bにより原水供給管16と連通しており、原水切換弁7a、8a、9a、10aを切り換えることによって各処理区画7、8、9、10へ原水を供給可能である。

【0011】 また、各処理区画7、8、9、10はそれぞれ、洗浄液切換弁7c、8c、9c、10cを介装した支管7d、8d、9d、10dにより洗浄液供給管17と連通しており、洗浄液切換弁7c、8c、9c、10cを切り換えることによって各処理区画7、8、9、10へ洗浄液を供給可能である。洗浄液供給管17は、流量弁18a、流量弁19aを介して薬品槽18および水槽19に接続しており、流量弁18a、19aを調節

することによって洗浄水または薬品と洗浄水との混合液が洗浄液として洗浄液供給管17に送り込まれるようになっている。洗浄液供給管17は洗浄液供給ポンプ20を介装しており、薬品槽18は次亜塩素酸ソーダなどの薬品を貯留し、水槽19は液中膜装置から一旦取り出した透過水などを貯留している。

【0012】また、各処理区画7、8、9、10はそれぞれ、排水切換弁7e、8e、9e、10eを介装した支管7f、8f、9f、10fにより排水管21と連通し、排水管21は排水ポンプ22を介装しており、排水

切換弁7e、8e、9e、10eを切り換え、排水ポンプ22を駆動することによって各処理区画7、8、9、10内の被処理水を排出可能である。

【0013】以下、上記構成における作用を説明する。全処理区画7、8、9、10において被処理水の固液分離を行う場合、原水切換弁7a、8a、9a、10aと、透過水開閉弁11b、12b、13b、14bとを開き、洗浄液切換弁7c、8c、9c、10cと、排水切換弁7e、8e、9e、10eとを閉じた状態として、原水供給管16より原水を供給し、曝気装置を通じ

て曝気空気を供給しながら、液中膜装置11、12、13、14により被処理水の固液分離を行う。透過水は透過水排出管11a、12a、13a、14a、透過水排出管15を通じて処理槽6の外部へ導く。

【0014】そして、特定の処理区画7内に設けた液中膜装置11を洗浄するに際し、他の処理区画8、9、10では上記と同様にして被処理水の固液分離を行いながら、処理区画7において以下のような手順で液中膜装置11を洗浄する。

【0015】すなわち、原水切換弁7aを閉じて原水の供給を停止するとともに、透過水開閉弁11bを閉じて液中膜装置11の運転を停止し、排水切換弁7eを開くとともに排水ポンプ22を駆動して、処理区画7内の被処理水を支管7f、排水管21により排出する。

【0016】次に、排水切換弁7eを閉じるとともに排水ポンプ22を停止し、洗浄液切換弁7cを開くとともに洗浄液供給ポンプ20を駆動して洗浄液供給管17より洗浄液を供給し、処理区画7内に液中膜装置11が浸漬する程度の洗浄液を満たす。そして、洗浄液切換弁7cを閉じ、洗浄液供給ポンプ20を停止する。なお、洗

浄液供給管17より処理区画7内に洗浄液を供給する際、流量弁18a、19aを調節して、水槽19内の洗浄水と薬品槽18内の薬品とが適当割合で混合されて洗浄液供給管17に送り込まれるようにする。

【0017】そして、洗浄液中に液中膜装置11が浸漬した状態において、液中膜装置11下方の曝気装置より曝気空気を供給して液中膜装置11の膜面を洗浄する。適当時間後、排水切換弁7eを開くとともに排水ポンプ22を駆動して、処理区画7内の被処理水を支管7f、排水管21により排出する。

【0018】その後、上記と同様にして、他の処理区画8、9、10内の液中膜装置12、13、14を順次洗浄する。上記したような手順によって、処理槽6から取り出すことなく液中膜装置11、12、13、14を洗浄できるので、メンテナンスが容易になるとともに液中膜装置11、12、13、14の寿命が延びる。また、被処理水の固液分離と液中膜装置11、12、13、14のいずれかの洗浄とを並行して行えるので、処理効率が向上する。

【0019】なお、上記した各弁および各ポンプを開閉および起動停止する制御装置を設けて自動運転するようにすれば、メンテナンスフリーを実現できる。

【0020】

【発明の効果】以上のように本発明によれば、処理槽を複数の処理区画に仕切って各処理区画ごとに液中膜装置を配置し、各処理区画に連通する原水供給管と洗浄液供給管と排水管とを配設しておき、各処理区画と各管との連通を切換弁により適宜操作して各処理区画ごとに液中膜装置を順次洗浄するようにした。これにより、処理槽内で液中膜装置を洗浄できるのでメンテナンスの容易化および液中膜装置の延命を図れるだけでなく、被処理水の固液分離と液中膜装置の洗浄とを並行に行なえるので処理効率の向上を図れる。

【図面の簡単な説明】

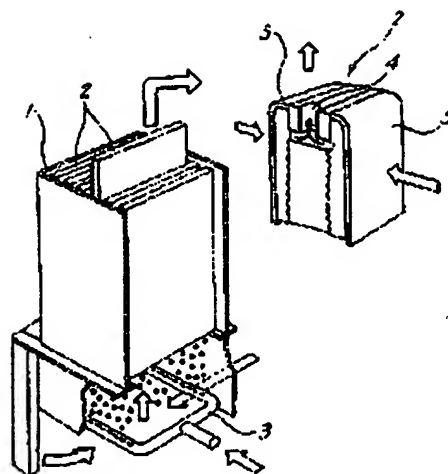
【図1】本発明の液中膜装置の洗浄方法が行われる処理槽の全体構成を示した説明図である。

【図2】従来の液中膜装置の構成を示した説明図である。

【符号の説明】

6	処理槽
7、8、9、10	処理区画
11、12、13、14	液中膜装置
16	原水供給管
17	洗浄液供給管
21	排水管
7a、8a、9a、10a	原水切換弁
7c、8c、9c、10c	洗浄液切換弁
7e、8e、9e、10e	排水切換弁

【图2】



- 5---站群環
7 8. 9. 10---站區圖
11. 12. 13. 14---站中鋼架雪
15---原水供給管
17---流平或供給管
21---排水管
7a. 8a. 9a. 10a---原水切換弁
7c. 8c. 9c. 10c---流平道切換弁
7a. 8a. 9a. 10a---排水切換弁

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the washing approach of the liquid media equipment used for a solid-liquid-separation application in a human excreta treatment plant etc.

[0002]

[Description of the Prior Art] Conventionally, in order to separate processed underwater active sludge and condensation sludge in a human excreta treatment plant etc., it is carrying out forming liquid media equipment in a processing tub etc. Liquid media equipment is a thing as shown in drawing 2, formed in parallel the plate-like membrane element 2 arranged in the vertical direction in the box-like casing 1 in which the upper and lower sides carried out opening, and has formed the aeration equipment 3 which supplies aeration air to the processed water in a tub under the membrane element 2.

[0003] And by giving suction negative pressure into the permeated water passage 4 of a membrane element 2 with a suction means (not shown), processed underwater active sludge etc. was caught by the filtration membrane 5 of a membrane element 2, and the permeated water which penetrated the filtration membrane 5 and flowed in the permeated water passage 4 is taken out as treated water.

[0004] He is trying for the upper counterflow of ***** which the air bubbles of the aeration air supplied through aeration equipment 3 have, and the processed water which occurs according to an airlift operation of air bubbles to wash the film surface of a membrane element 2 at this time.

[0005]

[Problem(s) to be Solved by the Invention] Although liquid media equipment has been made into washing needlessness since it has the self-cleaning device with aeration air which was described above, washing may be needed for the various reasons of a rapid concentration change etc. However, by the washing approach by which the conventional proposal is made, liquid media equipment must be taken out from a processing tub, it must be immersed in a drug solution washing tub, and there is a problem that effectiveness is very bad on a maintenance.

[0006] This invention solves the above-mentioned problem, it enables it to wash it, without taking out liquid media equipment from a processing tub, and thereby, while making a maintenance easy, it aims at prolonging the life of liquid media equipment.

[0007]

[Means for Solving the Problem] In order to solve the above-mentioned problem, the washing approach of the liquid media equipment of this invention The raw water change-over valve which is the washing approach of liquid media equipment of having established the inside of a tub in two or more processing partitions for every processing partition at the processing tub which a batch becomes, and was infixed in the branch pipe which opens each processing partition and a raw water supply pipe for free passage, The penetrant remover change-over valve infixed in the branch pipe which opens each processing partition and a penetrant remover supply pipe for free passage, The wastewater change-over valve infixed in the branch pipe which opens each processing partition and a drain pipe for free passage is operated suitably, and it is made to carry out sequential washing of the liquid media equipment for every processing partition. On the occasion of washing in each processing partition, the processed water in a processing partition is discharged with a drain pipe, a penetrant remover is supplied from a penetrant remover supply pipe, the processed water in a processing partition is permuted by the penetrant remover, and liquid media equipment is washed by supplying aeration air through aeration equipment.

[0008]

[Function] Since liquid media equipment can be washed by the above-mentioned configuration, without taking out from a processing tub, while a maintenance becomes easy, the life of liquid media equipment is prolonged. Moreover, since solid liquid separation of processed water and washing of liquid media equipment can be performed in parallel in two or more processing partitions, processing effectiveness improves.

[0009]

[Example] Hereafter, one example of this invention is explained, referring to a drawing. In drawing 1, the processing tub 6 has formed aeration equipment under the liquid media equipments 11, 12, 13, and 14 while it is divided into four processing partitions 7, 8, 9, and 10 and it forms the liquid media equipments 11, 12, 13, and 14 in the interior of each processing partitions 7, 8, 9, and 10 (not shown). The liquid media equipments 11, 12, 13, and 14 are equipped with the permeated water exhaust pipes 11a, 12a, 13a, and 14a which take out permeated water, respectively, and each permeated water exhaust pipes 11a, 12a, 13a, and 14a are opening them for free passage to the permeated water discharge main 15 through the permeated water closing motion valves 11b, 12b, 13b, and 14b. Various things, such as the conventional thing explained using drawing 2, can be used for the liquid media equipments 11, 12, 13, and 14 and aeration equipment.

[0010] Each processing partitions 7, 8, 9, and 10 are open for free passage with the raw water supply pipe 16 with the branch pipes 7b, 8b, 9b, and 10b which infixed the raw water change-over valves 7a, 8a, 9a, and 10a, respectively, and can supply raw water to each processing partitions 7, 8, 9, and 10 by switching the raw water change-over valves 7a, 8a, 9a, and 10a.

[0011] Moreover, each processing partitions 7, 8, 9, and 10 are open for free passage with the penetrant remover supply pipe 17 with the branch pipes 7d, 8d, 9d, and 10d which infixed the penetrant remover change-over valves 7c, 8c, 9c, and 10c, respectively, and can supply a penetrant remover to each processing partitions 7, 8, 9, and 10 by switching the penetrant remover change-over valves 7c, 8c, 9c, and 10c. The penetrant remover supply pipe 17 is connected to the chemical tub 18 and a tank 19 through flow rate valve 18a and flow rate valve 19a, and the mixed liquor of wash water, or a chemical and wash water is sent into the penetrant remover supply pipe 17 as a penetrant remover by adjusting the flow rate valves 18a and 19a. The penetrant remover supply pipe 17 is infixing the penetrant remover feed pump 20, the chemical tub 18 stores chemicals, such as sodium hypochlorite, and the tank 19 is storing the permeated water once picked out from liquid media equipment.

[0012] Moreover, each processing partitions 7, 8, 9, and 10 are open for free passage with a drain pipe 21 with the branch pipes 7f, 8f, 9f, and 10f which infixed the wastewater change-over valves 7e, 8e, 9e, and 10e, respectively. The drain pipe 21 is infixed the drainage pump 22, can switch the wastewater change-over valves 7e, 8e, 9e, and 10e, and can discharge the processed water in each processing partitions 7, 8, and 9 and 10 by driving a drainage pump 22.

[0013] Hereafter, the operation in the above-mentioned configuration is explained. When performing solid liquid separation of processed water in all the processing partitions 7, 8, 9, and 10, the raw water change-over valves 7a, 8a, 9a, and 10a, The permeated water closing motion valves 11b, 12b, 13b, and 14b are opened. The penetrant remover change-over valves 7c, 8c, 9c, and 10c, The liquid media equipments 11, 12, 13, and 14 perform solid liquid separation of processed water, supplying raw water and supplying aeration air through aeration equipment from the raw water supply pipe 16, as a condition which closed the wastewater change-over valves 7e, 8e, 9e, and 10e. Permeated water is led to the exterior of the processing tub 6 through the permeated water exhaust pipes 11a, 12a, 13a, and 14a and the permeated water discharge main 15.

[0014] And it faces washing the liquid media equipment 11 formed in the specific processing partition 7, and in the processing partition 7, the following procedures wash liquid media equipment 11 in other processing partitions 8, 9, and 10, performing solid liquid separation of processed water like the above.

[0015] That is, while closing raw water change-over valve 7a and suspending supply of raw water, permeated water closing motion valve 11b is closed, operation of liquid media equipment 11 is suspended, while opening wastewater change-over valve 7e, a drainage pump 22 is driven, and the processed water in the processing partition 7 is discharged with 7f of branch pipes, and a drain pipe 21.

[0016] Next, while closing wastewater change-over valve 7e, a drainage pump 22 is suspended, while opening penetrant remover change-over valve 7c, the penetrant remover feed pump 20 is driven, a penetrant remover is supplied from the penetrant remover supply pipe 17, and the penetrant remover which is extent to which liquid media equipment 11 is immersed in the processing partition 7 is filled. And penetrant remover change-over valve 7c is closed, and the penetrant remover feed pump 20 is stopped. In addition, in case a penetrant remover is supplied in the processing partition 7 from the penetrant remover supply pipe 17, the flow rate valves 18a and 19a are adjusted, the wash water in a tank 19 and the chemical in the chemical tub 18 are mixed at a suitable rate, and it is made to be sent into the penetrant remover supply pipe 17.

[0017] And in the condition that liquid media equipment 11 was immersed into the penetrant remover, from the aeration equipment of liquid media equipment 11 lower part, aeration air is supplied and the film surface of liquid media equipment 11 is washed. After suitable time amount, while opening wastewater change-over valve 7e, a drainage pump 22 is driven, and the processed water in the processing partition 7 is discharged with 7f of branch pipes, and a drain pipe 21.

[0018] Then, sequential washing of other processing partitions 8 and 9 and the liquid media equipments 12, 13, and 14 in ten is carried out like the above. Since the liquid media equipments 11, 12, 13, and 14 can be washed with a procedure which was described above, without taking out from the processing tub 6, while a maintenance becomes easy, the life of the liquid media equipments 11, 12, 13, and 14 is prolonged. Moreover, since washing of the solid liquid separation of processed water and either of the liquid media equipments 11, 12, 13, and 14 can be performed in parallel, processing effectiveness improves.

[0019] In addition, a maintenance free is realizable, if closing motion and the control unit which carries out deactivation are formed and it is made to carry out unattended operation of each above-mentioned valve and each above-mentioned pump.

[0020]
[Effect of the Invention] As mentioned above, the batch has arranged the processing tub to two or more processing partitions, and has arranged liquid media equipment for every processing partition, and the raw water supply pipe and penetrant remover supply pipe which are open for free passage to each processing partition, and the drain pipe are arranged, a free passage with each processing partition and each tubing is suitably operated by the change-over valve, and it was made to carry out sequential washing in liquid media equipment according to this invention for every processing partition. Since it not only can aim at easy-izing of a maintenance, and the prolongation of life of liquid media equipment, but liquid media equipment can be washed within a processing tub and solid liquid separation of processed water and washing of liquid media equipment can be performed in parallel by this, improvement in processing effectiveness can be aimed at.

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[Claim(s)]

[Claim 1] The raw water change-over valve which is the washing approach of liquid media equipment of having established the inside of a tub in two or more processing partitions for every processing partition at the processing tub which a batch becomes, and was infixed in the branch pipe which opens each processing partition and a raw water supply pipe for free passage, The penetrant remover change-over valve infixed in the branch pipe which opens each processing partition and a penetrant remover supply pipe for free passage, The wastewater change-over valve infixed in the branch pipe which opens each processing partition and a drain pipe for free passage is operated suitably, and it is made to carry out sequential washing of the liquid media equipment for every processing partition. On the occasion of washing in each processing partition, discharge the processed water in a processing partition with a drain pipe, and a penetrant remover is supplied from a penetrant remover supply pipe. The washing approach of the liquid media equipment characterized by washing liquid media equipment by permuting the processed water in a processing partition by the penetrant remover, and supplying aeration air through aeration equipment.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the explanatory view having shown the whole processing tub configuration to which the washing approach of the liquid media equipment of this invention is carried out.

[Drawing 2] It is the explanatory view having shown the configuration of conventional liquid media equipment.

[Description of Notations]

6 Processing Tub

7, 8, 9, 10 Processing partition

11, 12, 13, 14 Liquid media equipment

16 Raw Water Supply Pipe

17 Penetrant Remover Supply Pipe

21 Drain Pipe

7a, 8a, 9a, and 10a Raw water change-over valve

7c, 8c, 9c, and 10c Penetrant remover change-over valve

7e, 8e, 9e, and 10e Wastewater change-over valve

[Translation done.]

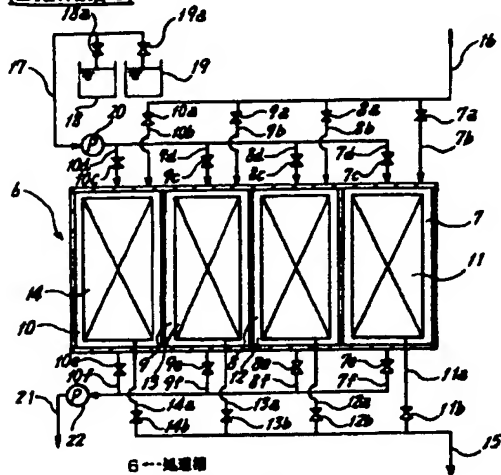
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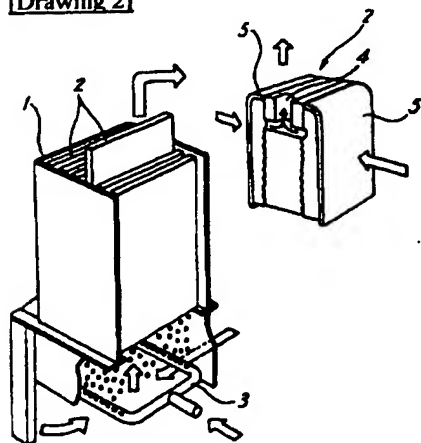
DRAWINGS

[Drawing 1]



- 6 --- 处理槽
 7. 8. 9. 10 --- 处理区画
 11. 12. 13. 14 --- 槽中隔板
 16 --- 原水供给管
 17 --- 洗浄液供給管
 21 --- 排水管
 7a. 8a. 9a. 10a --- 原水切換弁
 7c. 8c. 9c. 10c --- 洗浄液切換弁
 7e. 8e. 9e. 10e --- 排水切換弁

[Drawing 2]



[Translation done.]